REMARKS

The Final Office Action mailed November 7, 2003, has been carefully reviewed and by this Amendment, Applicant has canceled claims 11 and 14, amended claims 1 and 5, and added claim 15. Claims 1, 3-8, 10, 12, 13 and 15 are pending in the application. Claims 1, 5 and 15 are independent. In view of the amendments and remarks contained herein, favorable reconsideration in this application is respectfully requested.

The Examiner rejected claims 1, 4-8 and 10-14 under 35 U.S.C. 112, second paragraph, as being indefinite. By this Amendment, Applicant has amended claims 1 and 5 to clarify that the plurality of metal wire patterns are formed by patterning the same layer, and apologizes for the previous lack of clarity which arose due to an awkwardness in translation.

The Examiner objected to the previous Amendment filed on August 6, 2003, as introducing new matter in claim 14. While the phrase "dummy metal wire patterns" was merely being used as an inclusive term to refer to the combination of the dummy fine line patterns and the dummy pad patterns, claim 14 has been cancelled.

With respect to the specification, Applicant has amended the paragraph that spans from page 4 to page 5 to correct the inadvertent use of the word "larger" instead of --lower--. Support for this correction is representatively found in the specification at page 6, lines 16-26.

The Examiner objected to the drawings as not showing the "dummy metal wire patterns" of claim 14. Claim 14 having been cancelled, no amendment to the drawings is necessary.

The Examiner rejected claims 1, 3, 5, 6, 8, 10, and 12-14 under 35 U.S.C 103(a) as being unpatentable over U.S. Patent No. 5,534,728 to Kim et al. ("Kim") in view of U.S. Patent No. 6,534,459 to Yata et al. ("Yata"). Also under 35 U.S.C. 103(a), the Examiner rejected claims 4, 7 and 11 as being unpatentable over Kim in view of Yata and Fontana et al., Corrosion Engineering ("Fontana").

As set forth in amended claim 1, the present invention is directed to a semiconductor device capable of preventing corrosion of a fine metal wire pattern by adjusting the area of the fine metal wire pattern, which has a width of less than 1 μm, relative to the area of the overall metal wire pattern of which the fine metal wire pattern is part so that the area of the fine wire pattern is formed to constitute more than 1% of the total area of all the metal wire patterns, which are formed by patterning the same layer and are electrically connected to each other.

As set forth in amended claim 5, the present invention is also directed to a semiconductor device capable of preventing corrosion of a fine metal wire pattern, which has a width of less than 1 μm, within a metal wire pattern by employing dummy fine line patterns formed with the same material and pattern as that of the metal wire pattern. In this embodiment, the area of the dummy fine line pattern is formed to be less than 1% of the total area of the metal wire patterns and also less than a value obtained by dividing the area of the main fine line patterns by the total area of all the metal wire patterns, which are formed by patterning the same layer and are electrically connected to each other.

As just summarized, the present invention provides a semiconductor device capable of preventing corrosion of the fine metal wire pattern by adjusting an area ratio of the fine metal wire pattern and the dummy fine metal wire pattern. Contrary to the Examiner's conclusions, the cited references do not disclose or suggest a semiconductor device capable of preventing corrosion of the fine metal wire pattern by utilizing such area ratios.

Kim is directed to a semiconductor device having a corrosion-resistant metal wiring layer in which dummy metal lines are interposed between the endmost actual metal line and a wiring-free region in order to prevent corrosion of the actual metal lines. As acknowledged by the Examiner, Kim does not disclose fine line patterns having a width of less than 1 μm, nor does Kim disclose the area of the fine wire pattern being formed to constitute more than 1% of the total area of all the metal wire patterns (claim 1), or the area of the dummy fine line pattern being formed to be less than 1% of the total area of the metal wire patterns and also less than a value obtained by dividing the area of the main fine line patterns by the total area of all the metal wire patterns (claim 5).

As for Yata, Applicant respectfully requests the Examiner's reconsideration of the fair teaching thereof. Yata is directed to a resist residue remover that enables safe removal of resists without metal corrosion. According to an embodiment cited by the Examiner (column 3, lines 54-65), the resist residue remover is a solution containing condensed phosphates. With the specified phosphorus concentration, the problem of metal corrosion is mitigated such that even "a metal layer having a line width of the order of submicrons" can be treated effectively. Thus,

Yata teaches a *specific residue remover solution* that is suitable for use in removing residue on fine metal line widths. This cannot be read so broadly as to say that Yata teaches *the use of fine line patterns* in a ratio of more than 1% with respect to the overall metal pattern *as a means of controlling corrosion* (claim 1), or the use of dummy fine line pattern formed to be less than 1% of the total area of the metal wire patterns *as a means of corrosion control* (claim 5), as claimed by the present invention.

Nor would there be any suggestion to modify Kim in view of Yata. In fact, Kim teaches against the use of thin metal lines, noting that "thinner metal lines are especially susceptible to destructive corrosion" (column 1, lines 17-22).

Furthermore, neither Kim nor Yata teach or suggest dummy fine line patterns having a sub-micron width. Instead, Kim discourages the use of thin metal lines (column 1, lines 12-39) and further states that it is preferable for the dummy lines to be *wider* than the other metal lines (column 3, lines 24-26). Again, Yata does not teach the use of fine line metal patterns for corrosion control, as claimed by the present invention, but rather a residue removing solution for use *upon* fine line metal patterns; there is, therefore, nothing in the prior art that suggests the specified ratio of fine line patterns having submicron width relative to the total area of metal lines for corrosion prevention as claimed; favorable reconsideration is requested.

In rejecting Applicant's claims, the Examiner has stated that the claims fail to describe a definitive area of the fine line pattern in relation to the overall layout of the metal wire patterns and that the Applicant has failed to establish the critical nature of the area of the fine line

pattern being more than 1% of the total area of the metal wire patterns. Applicant asks the Examiner to reconsider in view of what Applicant is claiming. Specifically, Applicant is claiming the inclusion of fine line patterns and dummy fine line patterns within a plurality of metal wire patterns, these fine line patterns having a respective area that is above or below a threshold (1%) relative to the overall area and acting to prevent corrosion of metal wires from chemical mechanical polishing (CMP) processes. As the prior art does not teach or suggest the inclusion of fine line patterns in the manner claimed, it is not a question of Applicant's range versus another range disclosed in the prior art, but rather the very inclusion of the fine line patterns for this manner of corrosion prevention.

Furthermore, the basis of the invention is that the specified inclusion of fine line patterns and dummy fine line patterns achieves unexpected results, i.e., corrosion prevention for metal wires from CMP processes. As there is no prior art range to which the present invention is relative, Applicant's designation of the fine line patterns as being "more than 1%" with respect to the total metal wire pattern (claim 1), and of the dummy fine line patterns as being "less than 1%" of the total area (claim 5), establishes threshold values not known or considered in the prior art, and thus are not merely values to be compared within the context of a previously known range. In sum, the invention of a semiconductor device capable of preventing corrosion of wire patterns according to the area ratio of each wire pattern, is not shown or suggested by Kim or Yata. Hence, substantive reconsideration and withdrawal of the rejection of claims 1 and 5 is requested.

Claims 3, 4, 6-8 and 10, 12 and 13 are also in condition for allowance as claims properly dependent on an allowable base claim and for the subject matter contained therein. New claim 15 is in condition for allowance for at least the same reasons as claims 1 and 5. Specifically and additionally, claim 15 is directed to a device for preventing corrosion of aluminum or copper wires from a chemical mechanical polishing process, comprising a plurality of metal wire patterns which include main fine line patterns having a width of less than 1 μm, main pad patterns, connection pad patterns which electrically connect the main pad patterns to the fine line patterns, and dummy fine line patterns having a sub-micron width. The plurality of metal wire patterns are formed by patterning the same layer, and the area of the dummy fine line patterns, which are connected to the pad patterns, are formed to be less than 1% of a total area of the plurality of metal wire patterns according to the formula, $(d/(Ap+Ac+A+d) \times 100) < 1\%$. The area of the dummy fine line patterns is also formed to be less than a value obtained by dividing the area of the main fine line patterns by the total area (Ap+Ac+A+d), according to the formula, $(d/(Ap+Ac+A+d) < A/(Ap+Ac+A+d)$, where 'd' represents the area of the dummy fine line patterns, 'Ap' represents an area of the main pad patterns, 'Ac' represents an area of the connection pad patterns and 'A' represents the area of the main fine line patterns. This is clearly not shown by the prior art.

Accordingly, for at least the foregoing reasons, the pending claims are in condition for allowance.

Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early Notice of Allowance.

Respectfully submitted,

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Atty Docket No.: P67358US0
Date: February 9, 2004

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